Space Weather Forecast

Issued on Monday, 25 September 2023 at 13:15 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Isolated Moderate flares likely, with a slight chance of Strong flares (R1-R3 Radio blackouts). Chance of G1-G2 minor/moderate geomagnetic storms Days 1 and 2 (25-26 Sep).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with a single Moderate class flare observed in the past 24hrs, peaking at 24/1500 UTC from a sunspot region in the southeast. Frequent Common class flares were also observed, some long lasting. There are 10 sunspot regions on the visible disc, with one unnumbered. The aforementioned sunspot region was the most active and developmental region on the disc, continuing to show complexity in its configuration. Other regions in the northwest and west-centre disc have persisted as moderately sized regions, and continue to show some complexity and activity. A newly numbered region in the southeast has been quick to form and has already seen some activity so will be a region to keep an eye on. The other new region, as yet unnumbered, is rotating around the northeastern limb.

A number of eruptions were observed over the western limb, but are considered to be far-sided with no significant Earth component, pending further analysis. No other Earth-directed coronal mass ejections (CME) have been observed in the past 24hrs.

Solar Wind / Geomagnetic Activity: Slow wind conditions persisted for much of 24 Sep before a CME arrived during the evening. Speeds increased from background to slightly elevated. The Interplanetary magnetic field strength (IMF) was initially weak before becoming strong and then very strong. The north-south component also rose from weak to negatively strong, before becoming positively strong/very strong. Resultant geomagnetic activity was Quiet to Unsettled (Kp 1-3) at first, with G1/G2 Minor/Moderate Storm (Kp5-6) intervals between 24/1800-25/0600 UTC. Activity dropped back to Unsettled/Active levels from 25/0600 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background to moderate levels, with no Solar Radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Forecast to persist at Moderate with further isolated Moderate flares likely. There is also a slight chance of rising to High due to the potential for isolated Strong flares from the sunspot region in the southeast.

Solar Wind / Geomagnetic Activity: Ongoing impacts from a CME arrival on 24 Sep remain likely through the first part of Day 1 (25 Sep). Further CME arrivals are possible into Day 2 (26 Sep). Confidence is low however, with glancing impacts most likely. The slightly elevated solar winds are expected to continue through Day 1 (25 Sep), likely easing thereafter to slow ambient.

Geomagnetic activity is likely to remain Active (Kp4) initially with G1/G2 Minor/Moderate

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storming (Kp5-6) possible. Geomagnetic activity should then reduce back to Unsettled to Active (Kp3-4) with a chance of further G1/Minor storm intervals should any subsequent glancing CMEs occur into Day 2 (26 Sep). Quiet to Unsettled (Kp1-3) activity is then expected to dominate toward the end of the forecast period.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at moderate to background with no Solar Radiation storms occurring.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	50	30	20	10
Strong	G3	No	10	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	60	60
Very Active	R3 to R5 X	No	20	20	15	10

Solar Radiation Storms - (High Energy Protons):

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Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	15	15	10	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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